MEANING, MEANINGFULNESS, AND COLOR SEMANTICS AS MEASURED BY THE SEMANTIC DIFFERENTIAL AND "m" CONSTRUCT

A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF MASTER OF ARTS

IN THE GRADUATE SCHOOL OF THE

TEXAS WOMAN'S UNIVERSITY

COLLEGE OF EDUCATION

BY

GREGORY C. SMITH B.S.S.

DENTON, TEXAS

AUGUST 1981

The Graduate School

Texas Woman's University

Denton, Texas

May 14 1981

We hereby recommend that the Thesis prepared under our supervision by Gregory C. Smith entitled Meaning, Meaningfulness, and Color Semantics as Measured by the Semantic Differential and "m" Construct

be accepted as fulfilling this part of the requirements for the Degree of M.A.

Dissertation/Theses signature page is here.

To protect individuals we have covered their signatures.

Thesis
T281
S648m
c.2

Table of Contents

4217

Introduction

Human beings are born with the ability to perceive colors and to differentiate the myriad of chromatic shades, tints, and subtle hues frequently associated with color. As the organism matures, the colors become associated with words, objects and feelings; easily identifiable through a written word or actual visible wavelength. This faculty enables the child to organize a unique and logical environment, discriminate distinct structures and eventually produce a phenomenon of color meaning.

This paper investigates the differences and values of colors utilizing two separate measures of meaning, the Semantic Differential (Osgood, 1952) and the "m" construct (Noble, 1952). Both measures are well established tools used in assigning values to attitudes and meanings. Contrasting color and meaning research reveals the strengths and difficulties of applying systematic approaches to color meaning research, and shows that color and meaning cognitions studies have experimental value.

Philosophy understands meaning as something unique and variable, not easily understood and impossible to manipulate experimentally. The psychologist has linked behavioral and mental events to define meaning, where subjective interpretation of events by language are thought of as being the same as physical happenings. This view infers meaning as some dispositional concept that is experimentally observable, and objectively tangible. It is therefore imperative to be specific and exacting in any selection of a definition of meaning and to set clear limits about the research tool. The natural flaw of this approach is that it measures experimental meaning and is applicable solely to devised constructs like the Semantic Differential and the "m" construct.

Meaning

According to Bertrand Russell (1940), meaning and language are one phenomenon. Hunt (1940) however, warns against confusing verbal responses with the internal symbolic processes. Still later, when commenting on Semantic research, Allport (1955) reports the tendency to identify meanings with language. This early research contrasts the once popular belief that language was a reflection of thought, and was therefore a direct link to the mental event.

Meaning can be defined as a "set of specific referents to a word" (Saltz, 1969, p. 325). It is the observed physical object, a word characterizing the form. Meaningfulness is the extent a word has meaning, irrespective of the specific meaning. Meaningful words are co-referents of a concept, as well as to data of the same or other classes. Associations of an object do not mean the object; but rather add value to the understanding of the concept, making it in fact, more meaningful.

The "m" Construct

The "m" construct is a single-factor associative theory where one factor, past experience, is associated with a word. The extent a word has meaning is dependent on the conservation of old meanings, the degree of differentiation, and the level of abstractness. It measures meaningfulness by listing associations to nouns in 60 seconds and determining the mean of the number of associations, and was considered, in the Hullian tradition, Habit Strength.

> Meanings are postulated to increase in number not as an exponential growth function of the number of particular S-particular R reinforcements--as H in Hull's theory--but rather as a simple linear function of the

number of particular S-multiple R connections established (Noble, 1952, p. 425).

Noble (1952) was searching for a rational scale of meaning for 96 dissyllabic nouns. He founded his results on a military population acquiring an intergroup reliability of .993. The list consisted of 20% paralogs, 35% infrequent items, and 45% frequent items, taken from the Thorndike-Lorge tables (1944), a frequency tabulation designed to compare Habit Strengths and correlate the frequency of usage.

The "m" construct evolves from association studies of nonsense syllables (Glaze, 1928) where association values were defined as proportions of subjects who responded positively to a given item in a specific amount of time. In this particular study, the association value was designated as "m" and the time variable was three seconds. This experiment closely resembles the Noble studies of the early 1950's.

In 1950, Miller and Selfridge defined meaningfulness in terms of dependent probabilities of free association observations. Similarly, Thorndike (1948) investigated frequency of words and the association to the number of synonyms, while attempting to define the frequency of

words for modern English. Frequency was thought to be related to the number of synonyms in the language. The letter m was used to mean "occurence" and f was used to designate "frequency." The results linked, and equated f and m.

It seems obvious that frequency and "m" are irrevocably interrelated. Bousfield and Cohen (1955) showed that free recall is greater when high frequency words taken from the Thorndike-Lorge frequency table were recalled better than low frequency words.

Many experimenters equate "m" value and the frequency of exposure, the supposed basic mechanism behind the "m" construct (Underwood & Schulz, 1960; Postman, 1962). These authors offer alternative explanations for the construct, deriving their data from intralist similarity and interference investigations. To disprove the construct, Underwood and Schulz (1960) argued that frequency increases the number or responses available to the organism. "m" is associated with learning because higher frequency words have high "m" scores. Underwood and Richardson (1956) postulated that meaningfulness would increase retention of words and was therefore more important to learning. It was hypothesized that if high verbal associations caused

forgetting or interference, then meaningfulness could be ignored as a variable influencing learning. The results of the experiment showed that low intralist similarity, where words are not related, and high meaningfulness words increased learning. Also, high intralist similarity and low meaningfulness increased recall. The researchers concluded from these results that high meaningfulness increases interference; but intralist similarity was the deciding factor in influencing learning. A later study examined intralist similarity and meaningfulness and found that increased meaningfulness needed high intralist similarity to show high "m" scores (Underwood & Richardson, 1958).

To substantiate the global properties of the "m" construct, Noble had to eliminate frequency as a variable influencing "m" construct associations. Initially he showed there was a high degree of similarity and a stable relationship between psychological familiarity and physical frequency (Noble, 1954). Acquisition was a positive function of "m" (Noble, 1955) and was experimentally testable because the number of responses affecting the organism was controlled by the experimenter (Noble, 1955).

Analysis controlled for individual differences (Noble, 1957) and the results were inferred to paired-associate learning.

Paired-associate learning increases the number of words presented to the subject, and makes less meaningful materials easier to recall (Kimble & Dufort, 1955). Though there was some conflict (Cieutat, Stockwell, & Noble, 1958), low stimulus and high response scores were enhanced, relative to high stimulus and low response scores, due to the addition of the second word association.

Mandler and Campell (1957) related "m" to rates of serial learning and rates of acquisition. The results show that variations in associative frequency increased facilitation of learning. Though varied, there was no consistent learning between association and frequency. They also reported that prior associations tasks did not affect acquisition, lending an alternative idea to the notion of interference.

The Semantic Differential

The Semantic Differential is a scaling device used to measure meaning by identifying subjective judgments between two polar word opposites (good-bad, ugly-beautiful) (Osgood, 1952). These opposites are speculated to be the

essence of a statistical sample taken from the Semantic Space, an area understood as the central learning and behavior center. It is hypothesized that differentiation of word meaning occurs when a direction and a distance from the origin of the space are formed (Osgood & Tannenbaum, 1957). It is possible therefore to take any sample of opposites and, in part, define linguistic meaning of any particular word in relation to other like words (See Appendix A).

The amount of research on the Semantic Differential is impressive (Osgood & Tannenbaum, 1957; Snider 1967), especially in respect to communication and cross-cultural studies.

Color Meanings

Koffka (1925) determined that during the first year of life, the child is unable to define colors perceptually. As the child matures however, color language develops out of an inherent color perception that is latent in the child. The inherent and the learned become symbiotic. He further claims that the more saturated color is a better color and the human organism changes, at least in preference, toward more saturation. Though studies disclaim this (Hanawalt & Post, 1942), it seems obvious

that colors are perceived before they are linguistically linked and as such, humans have had more exposure (frequency) to color than color words.

The first systematic approach to measuring color meanings and attribute values to colors began in the early 1900's. Washburn (1911) was one of the first researchers to attempt to rank colors on a scale of pleasantness and unpleasantness. He discovered that tints and shades had a higher numerical value than saturated colors, and therefore had a different meaning content. This is among the first studies to scientifically manipulate colors and compare the meanings across bipolar dimensions.

In a later study Eysenck (1941), asked subjects to rank Ostwald colors across the bipolar factor of saturated-unsaturated. He discovered a definite order of preference from blue to yellow, and a greater liking for saturated colors. Granger (1955) also discovered a similar order of preference. Because of the agreement between the groups, he determined that color appreciation is a factor dependent on aesthetic variables. These variables however, are biologically based and not culturally formed.

Hevner (1935) used portraits to examine the aesthetics and affective values of colors. He asked artists to describe painting according to mood reflected by the art and color. Though artistic selection of lines was found to be the most important consideration, colors also affect the mood and tone of the painting. Two colors, red (happy, excited) and blue (serene, sad, dignified) were found to be the most heavily used in the artistic selection of mood colors. Though this is a symbolic application of color, it is distinct from the idea of color symbology and the color blind, where differences in Semantic Space can be measured versus aesthetic combination of colors (Hofstaetter & Primac, 1957). We, quite naturally approach any color situation with ideas of color, and this is an important consideration for the artist and psychologist.

Attempts have been made to evaluate personality through colors. Two personality tests, the Color Pyramid Test (Schaie, 1963) and the Rorschach Ink Blot Test (1942), make the claim that serious emotional problems can be detected through the use of color stimuli. Rorschach claimed impulsivity, suggestibility, and emotionality have a particular relationship with color, and further

suggested the use of color for diagnosis of schizophrenics, manic-depressives, neurotics and even epileptics. Schaie (1963) substantiates these results.

Reviews of the literature concerning color relevant personality variables have been made by Cerbus and Nichols (1963). Finding no substantial evidence for the use of color as a diagnostic tool, they claim it has little use. Referring explicitly to the Rorschach, color reactions are brought about by stimulus change rather than color affect.

Schaie (1966) points out three dimensions of color research: The biological dimension where color stimulates a physical reaction, the esthetic dimension as investigated by Karwoski et al. (1942), and finally the symbolic dimension. In the Pyramid Test, she attempts to show a stable relationship between preferences for choices of specific colors and personality variables at the symbolic level.

Solomon and Postman (1952) found that personality variables may be significant determiners of perceptual sensitivity. Color is but one of many possible factors though. Choungourian (1972) found that neurotics preferred red and purple and extraverts yellow and green. Color may indicate some factors of introversion/

extraversion, and at least be helpful, in part, in discovering personality variables, especially for the mentally healthy, and in some cases the mentally ill. It should be pointed out that the author advises caution and selective use of the information.

Color psychology can be used to manipulate behavior, improve learning, and increase performance, though not to the exclusion of all else. Lang (1940) claims that color offers an entertaining method of revealing innate personality traits. If one likes a certain color, particular characteristics are supposedly prevalent in their personality. This ridiculous assumption is unfounded and rather sensational, and color psychology would do well to avoid the all-encompassing speculation. It is by no means a final answer to explaining any behavior in whole or in part. Essentially this method of determining color personality lacks rigorous scientific approaches and empirical observation.

Jacqueline Schick (1977) attempted to determine the relationship between personality, color and gross motor performance. After assessing personality of the subjects on the Thurstone Temperament Schedule, she had girls throw a

ball at different colored targets. Only five out of 105 were significant and no tenable hypothesis could be reached. This however is the direction color research should follow, using precise instrumentation and blended with intelligent observation.

Synesthesia (Karwoski, Odbert, & Osgood, 1942), which is an actual physical anomaly occuring when subjective sensations, usually associated to one sense, are attached to sensations of another group. In an experiment at Dartmouth, college students were exposed to various types of music and asked to report any visual sensations of color and the mood they felt in association to the color. The subjects who reported different colors in association to music, also reported different moods. The analogy of sight, sound, and feeling, readily translating into a concise verbal symbol, is easily understood as a clue to the value of colors as relating to meaningful material. Colors affect the organism, and this necessarily reflects the subjective quality of the musical experience (Odbert, Karwoski, & Eckerson, 1942).

Color mood associations have also been shown to exist in nursery school children (Lawler & Lawler, 1965). Apparently the associations can be manifested regardless of

cultural conditioning and may be an indication of an inherited, subjective characteristic.

A study by Wexner (1954) identified the color-mood associations of seven distinct colors. Red reflected the association to excitement/stimulation; blue, tender/soothing; purple, dignified/stately; yellow, cheerful/joyful; and black, powerful/strong. He found no sex differences. This is one of many studies where though the study reflects an empirical attempt to define color by moods, the simplicity and lack of more color choices inhibit excessive acceptance or validation of the results. Replicating the study at a later date, Wexner (1954) found no associations to some mood tones. Using 10 colors Schaie (1961) scaled the association between mood tones and color. Her findings agreed with the Osgood-Tannenbaum (1957) Semantic Differential studies, though there was some disagreement on the value of yellow.

Pecjak (1970) concluded from his research on synesthesia that "...words which are linked in verbal synesthesiae mainly have a weak common component of meaning." (p.626) By example, linking the word sweet with love and red, he found there was a lack of consistent association as comparable to the love-red association. The definitional

content of sweet does not overlap with the content of love or red. The color-emotion associations were by far the most significant, possibly proving greater emotional meaning to colors.

Roy Dorcus (1932) looked at color as it could be associated to advertising, an industrial medium needful of concise color patterns to sell particular products. Subjects were asked to associate colors to words and to report what word the color reminded them of. As in the early synesthesia studies, there was a tendency to associate some colors and moods. There was also a pattern of associating some objects to more than one color (i.e. dress). Results also showed that there was little relation between the number of times a given word has been associated with a color, and the number of times the color will be given in response to a word.

Cross-Cultural Studies

Comparing cultural reactions to color may be the only way to generalize color affect, preference, and meaning to the human organism. If color is environmentally induced, or if it is culturally defined or a biological function, then the researcher can isolate the essential factors of a color system. Studies have been done using the Semantic

Differential (Tanaka, Oyama, & Osgood, 1963, Adams & Osgood, 1973), delineating definite cultural influences.

Researchers in Japan (Garth, Ikeda, Langdon, 1924) have reported racial preferences for color. In America (Garth, 1924) and China (Chou & Chen, 1935, Shen, 1937) color researchers have identified differences between American and Oriental cultures. In a landmark study, Choungourian (1968) investigated the cultural variation using paired comparisons and Ostwald hues. Comparing American, Lebanese, Iranian, and Kuwait students, he discovered a significant cultural difference, and inspired the idea that color preference, or even color perception, is in part, environmentally determined. A cross-cultural study by Osgood (1959), compared Navajo and Anglo cultures through visual-verbal synesthetic trends. He found little difference between the groups, but interestingly enough, there was more agreement on color chips used than on the color words.

Winick (1963) interviewed subjects from many countries about color and symbol dislikes. By establishing a list of disapproved objects and colors he felt it would be useful to government officials or tourists alike. The author felt it important therefore, to discuss and define

religious and cultural taboo words and colors, especially in light of the perceptual defense against taboo words (McGinnies, 1949). Black is almost always refered to as evil, bad, dark, and white as good, clean and pure. Even in African nations, black was bad (Staats & Staats, 1961).

Western culture favors white to black human figures when administered the Color Meaning Test II (Iwawaki, Sonoo, Williams, & Best, 1978). The light-skinned preference was a highly correlated test with age and possible cultural learning.

Racial groups are often identified by color names, distinctive in their connotative meaning (Habin & Williams, 1966). The meaning of color can be hypothesized to become associated to other terms.

Relating prejudice with connotative meanings of color across geographical and racial lines, Williams (1964) stressed the importance of culture and the difference of meanings between blacks and whites. Prejudice is just one variable that can be better understood through a complete investigation of color phenomenon.

Hurlock (1927) compared white and negro children and found a slight difference between the two groups. She also

compared I.Q. with color preference and race; but found no significant differences. If the color preferences were influenced by the environment, children would reflect the difference with a greater significance. Using color pairs, consistent preferences for cool hues and higher saturated colors were found. As the child matures, there is less preference for the higher saturation, but this may vary as a factor of resolving the conflicts of pairs according to greater hues, and not reflecting preference at all. Hogg (1969) reports a preference for saturation, thus affirming the appeal for richer colors.

Guilford (1934) also reports a preference for lighter colors to darker colors, and that hue was the most important factor in influencing the affective value. Tint and chroma had little affect. In general, there was a greater preference for unmixed colors and for shorter wavelength. The principal finding, corresponding to the two-stage Ladd-Frankin color theory was that the two harmonics are actually two different systems of color appreciation, and these are bound up with the two corresponding systems of color vision, yellow-blue and red-green. Yellow-blue, the shorter wavelength, was more agreeable than the longer wavelength red-green. Subsequent studies (Allen &

Guilford, 1936) determined the affective value was founded in the analysis of the components of the combination. Especially the good/poor combination. Hue also showed greater emotive responses and was stronger for women. It also correlated highly with tint.

Chinese researchers defining general and specific preference for color (Chou & Chou, 1934) discovered preference was a function of the object and inseparable from the color associations. This indicates that valuable information is inherent in the associations to color, and is applicable across cultures.

While color affects cultural bias, and in some cases is derogatory, it also connotes a reflection of physical manifestations such as size, weight, and temperature. As early as 1907 (Bullough) colors have been examined as to the influence they have on objects. In Germany, Wright (1962) controlled for hue, lightness, and saturation and administered the Semantic Differential on 45 colors. He established the importance of hue and definite influence of it on warmth and weight the colors gave to particular objects.

An interesting study investigating weight of colors was conducted by Payne (1926). Subjects were asked to

guess which block was heavier or lighter. Though brightness seemed important, the darker colors were perceived as heavier. Unfortunately, no discrepancies of weight were discussed.

In a more exacting experiment, Warden and Flynn (1926) used cartons to discriminate colors. Their findings support the earlier studies where weight was influenced by the color, but size was not found to be a color dependent variable. Similar studies in Japan (Kimura, 1950), and in America (Newall, 1941) have substantiated the results of the previous research, and have concluded the effects of color on objects does reflect weight size and temperature. Newall summarized the results as reds and yellows as the warmest, yellow-green-blue as the coolest. This was found to be independent of sex or race, and rather dependent on bimodal reception from common chromatic sources.

Actual perception of colors reflecting something more than a simple wavelength provides an important clue to color perception. Color creates and adds to the form of an object. When void of color (black or white) the object takes a different form, size, and weight. As the colors are mixed and dispersed across perceptual dimensions, they

create new meanings and new values. Meaning of color and color associations will reflect the change.

Wright and Gardner (1960) when investigating black and white pictures, discovered that connotations and meaning were affected by the context in which the cards were presented. By the second grade, students were sensitive to the printed word (Rosinsk, Golinkoff, & Kukish, 1975). Obviously, in the case of writing black on white background, greater meaning is reflected. It simply depends on the context and the form. Hendrick (1968) identifies figures superimposed on colored backgrounds, and claims figures can be manipulated to create different sets of objects.

Purpose

The Semantic Differential and the "m" construct are both designed to create objective criteria to mark differences in meaning. The Semantic Differential and the "m" construct have been used specifically to measure color names (Williams & Foley, 1968). These authors discovered a high degree of correlation between colors and their connotative meanings, when measured by the Semantic Differential. This present study replicates the Semantic Differential procedure in part, and will expose the subjects to similar color plates and color words.

Efforts have also been made to measure the differences between the "m" construct and the Semantic Differential by investigating cultural attitudes (Szalay & Brent, 1967). The two instruments correlated highly when measuring cultural meanings, and Szalay contends that free association is useful for analysis of group meanings.

The purpose of this study is to examine the relationship between the "m" construct and the Semantic Differential as they relate to color plates and color words. It was expected that there would be more associations to color words than color plates on the "m" construct association task because in general humans have had more exposure to color word associations than color associations. Because both instruments measure meaning, it was also expected that the Semantic Differential response to color plates and color words will correlate highly with the analagous "m" construct responses to color plates and color words.

Method

Subjects. Sixty-eight female students were selected from the population of volunteer undergraduates attending regular classes at Texas Woman's University. Thirty-four subjects were randomly assigned to two experimental conditions, color plate or color word groups. Half of the subjects from each group were also randomly assigned to color plate and color word treatments.

Materials. The Semantic Differential developed by Osgood (1952) and the "m" construct created by Noble (1952) were used to measure degrees of color word and color plate meanings. Fifteen polar word opposites selected from the existing Semantic Differential index (Osgood & Tannenbaum, 1957) were used to sample the Semantic Space (See Appendix A). Each subject in the Semantic Differential groups was given a nine-page booklet, with one page of instructions and eight pages of the same bipolar scales. Subjects in the "m" construct groups received a three-page booklet with one page of instructions and two pages of answer columns (See Appendix B).

The color plate stimuli were presented on Color Aide posters 45 x 60 cm on brown background 70 x 55 cm square.

The color word stimuli were printed in black and each letter was 10 cm high by 3 cm wide. The background was brown cardboard 70 x 55 cm square. The eight colors were red, blue, green, yellow, orange, purple, white and black. The colors corresponded to appropriate Ostwald color hues.

Procedure. Color plate and color word groups (n=68) responded to the Semantic Differential and the "m" construct. Fifteen subjects in the color plate group made responses first to the Semantic Differential, and 15 minutes later, responded to the "m" construct. The other 15 subjects had the order reversed. This same systematic procedure followed for the color word group. Subjects in the Semantic Differential had unlimited time to work the test, but the colors were presented approximately every 60 seconds. The "m" construct groups were limited to 60 seconds exactly to complete as many associations as possible for one color. For each group, the test took about 30 minutes, and in total 2 hours.

The instructions were taken verbatim from Noble (1952) and Osgood (1952) with minor variations to allow for the incorporation of the color words and color plates. No reward was offered to participate in the study, but the shortness of time was emphasized.

Results

The means and standard deviations for the color word and color plate groups responses to the Semantic Differential and "m" construct can be found in Table 1. The largest mean scores for the "m" construct occurred for white, red, green and black. The lowest number of associations were found for purple and orange. The Semantic Differential task also resulted in a higher score for black and white, while orange had the lowest meaning. Scores for green, yellow, blue, purple and red were intermediate in magnitude.

Paired sample *t* tests were implemented to compare the mean response of the color word and color plate groups on each of the eight colors and for each task. As may be noted in Table 1, none of the 16 *t* tests were significant. The highest difference was found for blue on the "m" construct task, and the smallest difference was found for yellow as measured by the Semantic Differential.

The color word and color plate groups were further contrasted with simple discriminant function analyses. Variables were entered into the discriminant function following the Wilk's method, and statistical significance

of the results were evaluated using a χ^2 approximation of the Wilk's λ. Significant functions were clarified by an interpretation of standardized discriminant function coefficients determined by the product of the unstandardized discriminant coefficient and the square root of variance taken from the diagonal of the within-groups, variance-covariance matrix. Significant discriminant functions were also accompanied by classification analyses so that the efficiency of the discrimination could be evaluated.

The two groups were successfully discriminated when all "m" construct and Semantic Differential responses were entered into this analysis, $\lambda = .85$, $\chi^2 = 10.68$, $p = .058$. The standardized discriminant function coefficients for the variables that were included in the discriminant function are as follows: "m" construct black (.746), "m" construct white (-.526), "m" construct yellow (.786), "m" construct blue (-1.149) and Semantic Differential purple (.389). The centroid for the color word group was -.422 and .422 for the color plate group. The participants in the color plate group, therefore, tended to give a larger number of associations to black and yellow and a smaller number

of associations to white and blue than the color word subjects. The equality of the group covariance was demonstrated for this analysis, Box's M= 16.8, p= .42. The classification analysis revealed that 59% of the color word subjects and 65% of the color plate participants were correctly classified by the classification functions.

Pearson product correlation coefficients were used to determine the relationship between the Semantic Differential and "m" construct responses. The resulting coefficients for the color word and color plate groups for each color, and for both groups combined, are presented in Table 2. The only significant correlation occurred for orange and black in the color word group; these two coefficients however, are very low.

Discussion

Discriminant function analyses revealed some small differences between the color word and color plate group responses on the "m" construct black, white, yellow and blue colors. The color plate group tended to give higher associations to black and yellow, and lower responses to white and blue. These differences are probably due to a subject's ability to make associations in a limited

amount of time. There is also a possibility that associating to black and yellow was easier due to the subject's prior experience with the colors. Results in general, however, refute the hypothesis that color words and color plates have different perceived meanings, and that color plates in specific have greater meaning than color words. From this evidence it is possible to infer that for color language, meanings and cognitive perceptions are essentially the same phenomena. It is conceivable to understand meaning and language as one event, contrary to Hunt's warning about confusing verbal responses and internal processes (1940). The present research concludes, as per Russell (1940), that meaning and language are part of the same process, and that the mental event cannot be separated from the physical happening. It also appears that measuring language tasks, is essentially the same as measuring the underlying cognitive event, or idea. Since meaning and language are the same phenomena, it seems the measurement of language is the objective measurement of meaning.

High numbers of associations can also be explained by frequency of exposure to primary colors. Studies before Noble (1952) indicate that high frequency of exposure leads to high "m" construct values (Thorndike,

1948). This supports the idea that color perceptions and color meanings are environmentally determined (Choungourian, 1968). These results also hint at a common cognitive or associative function which color words and color plates have in common. The Semantic Differential probably measures most effectively the internal process developed from experience, where the "m" construct investigates the number of acquired associations, environmentally induced. Following the Semantic Differential theory of meaning, it can be conceptualized that perceived and linguistic color occupy the same Semantic Space. Similarily, association theory can explain the phenomenon as simply equivalent numbers of associations, where the colors have the same phenomenological background.

Pearson computations for the Semantic Differential and "m" construct show significant correlations for orange and black when the "m" construct and Semantic Differential were compared for the color word group. These scores were probably due to chance, and the results are generally indicative of two independent measurements of meaning, and not a lack of meaning as far as colors are concerned. The two instruments investigate different values of meaning and meaningfulness which have various

orientations to definitions of color meanings. It is obvious from the results on the t-tests that neither measure was sensitive enough to adequately test for color meanings. This is reflected in the lack of correlation between the measures and absence of extreme scores for means. This is not to imply that either measure fails to find meanings in color; but rather that they measure different learning centers or mental structures within the brain.

This research is not intended to oversimplify meaning and language acquisition. Essentially this experiment measured an extremely well defined theoretical construct, and limited the concepts to a select pool of colors that had common associations between them prior to the testing. The fact that color itself is a meaningful word influences the associations each subject had to a specific color. The obvious nature of the list similarity and the fact that there is a common association to any color, could explain the consistent number of associations subjects made to each color. This is borne out in studies by Underwood and Richardson (1956) where it was found that a high number of verbal associations were the result of high intralist similarity.

Lack of significant results may also be due in part to a certain amount of self-talk during the color word and color plate presentation. In other words, naming the color internally during the procedure may essentially have the same impact as seeing the color word. In a sense, the measure investigated the same cognitive structure, and the color plates and color words are simply associations to the internal mental process.

Another structural difficulty is that one measure has an associative format and the other is a contrived questionnaire. Both have structural limitations and inhibit subjective responses from subjects, though the "m" construct offers a little more freedom for the subjects. The Semantic Differential was easier to respond to by subjects and easier to mark higher scores. "m" construct responses however, involved some mental concentration, and physical effort. Also, scores could have reflected unmotivated responses which could have contributed to the low scores on the "m" construct.

Black and white color words and color plates for both the "m" construct and Semantic Differential were scored very high. This is substantiated by studies where black was usually associated to highly emotional words like evil, bad, and dark; and white was linked to

good and pure (Staats & Staats, 1961). This western culture favors white (Iwawaki, Sonoo, Williams, & Best, 1978); but it basically means the same as black, revealing again the social significance and environmental impact of colors. It is this direction of research which seems the most favorable for distinguishing color meanings. These considerations and findings also fail to support the idea that preference affects meaning, or that the preferred color had the greater meaning. All colors seemed to vary little from one another, and carried basically the same amount of meaning. This simply proves the slight effect of preference on the meanings of color.

This experiment supports the Williams and Foley (1968) study where it was discovered that there was a high correlation for colors and their connotative meanings. The word obviously is as symbolically significant as the color hue, and as objectively measurable according to specific limitations. The linguistic and cognitive processes are so intertwined, they cannot be separated by present psychological methods.

The methods used here to measure color meaning should not be considered irrelevant; but are perhaps inadequate concerning the fine distinction needed to be

made between color words and color plates. Necessarily "meanings" has several meanings, and though there is little correlation between the Semantic Differential and "m" construct, they can be useful for investigating only a small part of the larger whole of meaning. Each instrument should be used with caution, and interpretation of results should be utilized broadly. Both have value depending on a situational need, and both measure some concept of meaning.

The Semantic Differential use is more concerned with attitude and cognitive directional indices on a select group of words. The "m" construct results give the experimenter individual responses to stimuli, and is useful for examining physical associations to concepts. This can be helpful in that it gives a direct link to what an individual thinks about when presented with a concept.

In summary, it appears color words and color plates have the same meaning when measured by either the Semantic Differential or "m" construct. The results did not support an earlier study that found a correlation between the two tests (Szalay & Brent, 1967) or the Osgood (1959) studies where cultural differences were found between the colors. For the purposes of this

experiment, the colors elicited responses that were generally consistent for all colors, though black and white did have relatively high mean scores.

Table 1

t-test Results

"m" Construct						Semantic Differential					
Color	Color Plate		Color Word		Df	t	Color Plate		Color Word		Df	t
	$\bar{X}$	Sd	$\bar{X}$	Sd			$\bar{X}$	Sd	$\bar{X}$	Sd		
Orange	6.3	2.5	6.2	3.3	66	-.16	38.9	8.1	36.5	7.3	66	-1.28
Black	8.7	3.2	8.2	2.3	66	-.64	49.2	7.3	47.3	8.6	66	-.95
White	9.3	3.6	9.7	2.7	66	.46	47.4	7.0	45.6	8.9	66	-.93
Green	8.4	2.7	8.5	2.8	66	.22	40.6	8.6	40.9	7.9	66	.16
Yellow	8.2	3.3	7.6	2.9	66	-.68	44.4	6.8	44.6	8.7	66	.14
Blue	7.1	3.0	8.4	3.2	66	1.74	41.9	8.3	40.7	7.4	66	-.58
Purple	5.6	3.0	6.0	2.5	66	.61	41.3	8.4	40.0	9.3	66	-.57
Red	8.4	3.3	8.7	3.1	66	.37	42.6	6.9	42.9	8.0	66	.19

Table 2

Pearson r Correlation Coefficients

Color	Color Word	Color Plate	Combined
Orange	.48**	-.13	.17
Black	.31*	.16	.22
White	.02	-.18	-.08
Green	.16	-.14	.01
Yellow	.13	.03	.07
Blue	.06	-.15	-.06
Purple	-.02	-.26	-.14
Red	.06	-.11	-.02

*$\underline{P}$ .05
**$\underline{P}$ .01

Appendix A

Instructions

The purpose of this study is to measure the meanings of certain colors to various people by having them judge them against a series of descriptive scales. In taking this test, please make your judgments on the basis of what these colors mean to you. On each page of this booklet you will find a different color word to be judged and beneath it a set of scales./ I will display a color to be judged, and in your booklet you will find a set of scales. You are to rate the color on each of these scales in order.

Here is how you are to use these scales:

If you feel that the color is very closely related to one end of the scale, you should place your check-mark as follows:

fair _X_:___:___:___:___:___:___unfair

or

fair ___:___:___:___:___:___:_X_unfair

If you feel that the concept is quite closely related to one or the other end of the scale (but not extremely), you should place your check-mark as follows:

fair ___:_X_:___:___:___:___:___ unfair

or

fair ___:___:___:___:___:_X_:___ unfair

If the concept seems only slightly related to one side as opposed to the other side (but not really neutral), then you should check as follows:

fair ___:___:_X_:___:___:___:___ unfair

or

fair ___:___:___:___:_X_:___:___ unfair

The direction which you check, of course, depends upon which of the two ends of the scale seem most characteristic of the thing you're judging.

If you consider the concept to be neutral on the scale, both sides of the scale equally associated with the concept, or if the scale is completely irrelevant, unrelated to the concept, then you should place your check-mark in the middle space:

fair ___:___:___:_X_:___:___:___ unfair

IMPORTANT: (1) Place your check-marks in the middle of spaces, not on the boundaries.

(2) Be sure you check every scale for every concept--do not omit any.

(3) Never put more than one check-mark on a single scale.

Age: _____ Group: _____

Sex: _____ Date: _____

good ___:___:___:___:___:___:___ bad

large ___:___:___:___:___:___:___ small

beautiful ___:___:___:___:___:___:___ ugly

hard ___:___:___:___:___:___:___ soft

strong ___:___:___:___:___:___:___ weak

calm ___:___:___:___:___:___:___ agitated

red ___:___:___:___:___:___:___ green

loud ___:___:___:___:___:___:___ soft

pleasant ___:___:___:___:___:___:___ unpleasant

black ___:___:___:___:___:___:___ white

happy ___:___:___:___:___:___:___ sad

heavy ___:___:___:___:___:___:___ light

relaxed ___:___:___:___:___:___:___ tense

hot ___:___:___:___:___:___:___ cold

bright ___:___:___:___:___:___:___ dark

Appendix B

Instructions for "m" Group

This is a test to see how many words you can think of and write down in a short time.

You will be given a (key color/key color word) and you are to write down as many words which the (key color/key color word) brings to mind. The words which you write down may be things, places, ideas, events, or whatever you happen to think of when you see the (key color/key color word).

For example, think of the (color/color word) (show color/"brown"). Some of the words or phrases which ("this"/"brown") might bring to mind are written here:

wood	soil
cardboard	dust storm
hair	field
tan	mud

No one is expected to fill in all the spaces on a page, but write as many words as you can which each (color/color word) calls to mind. Be sure to think back to the key (color/color word) after each word you write down because the test is to see how many other words the key (color/color word) makes you think of. A good way to do this is to repeat the (color/color word) over and over to yourself as you write.

Age: _____ Group: _____

Sex: _____ Date: _____

References

Adams, F.M., and Osgood, C.E. A cross-cultural study of the affective meanings of color. Journal of Cross-Cultural Psychology, 1973, 4, 135-156.

Allen, E.C., and Guilford, J.P. Factors determining the affective value of color combinations. American Journal of Psychology, 1936, 48, 643-648.

Allport, F.H. Theories of Perception and the Concept of Structure. New York: John Wiley and Sons, 1955.

Bousfield, W.A., and Cohen, B.H. The occurence of clustering in the recall of randomly arranged words of different frequencies of usage. Journal of General Psychology, 1955, 52, 83-95.

Bullough, E. On the apparent heaviness of colors. British Journal of Psychology, 1907, 2, 111-152.

Cerbus, G., and Nichols, R. Personality variables and response to color. Psychology Bulletin, 1963, 60, 566-575.

Choungourian, A. Color Preference and cultural variation. Perceptual Motor Skills, 1968, 26, 1203-1206.

Choungourian, A. Extraversion, neuroticism, and color preferences. Perceptual and Motor Skills, 1972, 34, 724-726.

Chou, S.K., and Chen, H.P. General versus specific color preferences of Chinese students. Journal of Social Psychology, 1935, 6, 290-314.

Cieutat, V.J., Stockwell, F.E., and Noble, C.E. The interaction of ability and amount of practice with stimulus and response meaningfulness (m,m') in paired associates learning. Journal of Experimental Psychology, 1958, 56, 193-202.

Dorcus, Roy M. Habitual word associations to colors as a possible factor in advertising. Journal of Applied Psychology, 16, 277-287, 1932.

Eysenck, H.J. A critical and experimental study of color-preferences. American Journal of Psychology, 1941, 54, 385-394.

Finstuen, Kenn. Use of Osgood's semantic differential. Psychological Reports, 1977, Vol. 41, 1219-1222.

Garth, T.R. A color preference scale for one thousand white children. Journal of Experimental Psychology, 7, 233-241, 1924.

Garth, T.R., Ikeda, K., and Langdon, R.M. The color preferences of Japanese children. Journal of Social Psychology 1924, 2, 397-402.

Glaze, J.A. The association value of nonsense syllables. Journal of Genetic Psychology, 1928, 35, 255-269.

Granger, G.W. An experimental study of color preferences. Journal of General Psychology, 1955, 52, 3-20.

Guilford, J.P. Affective value of color as function of hue, tint, and chroma. Journal of Experimental Psychology, 1934, 17, 342-370.

Habin, S.P., and Williams, J.E. Conditioning of color connotations. Perceptual and Motor Skills, 1966, 22, 217-218.

Hanawalt, N.G., and Post, B.E. Memory trace for color. Journal of Experimental Psychology, 1942, 30, 216-227.

Hendrick, C. Effect of cognitive set on color perception. Journal of Personality and Social Psychology, 1968, 10, 487-494.

Hevner, K. Experimental studies of the affective value of colors and lines. Journal of Applied Psychology, 1935, 19, 385-398.

Hofstaetter, P., and Primac, D. Colors and the color blind, Journal of General Psychology, 1957, 57, 229-240.

Hogg, J. A principal components analysis of semantic differential judgments of single colors and color pairs. Journal of General Psychology, 1969, 80, 129-140.

Hunt, E.B. Concept Learning: An Information Processing Problem. New York: John Wiley and Sons, 1962.

Hurlock, E.B. Color preferences of white and negro children. Journal of Comparative Psychology, 1927, 7, 389-464.

Iwawaki, S., Sonoo, K., Williams, J.E., and Best, D.L. Color bias among young Japanese children. Journal of Cross-Cultural Psychology, 1978, 9, 61-73.

Karwoski, T.F., Odbert, H.S., and Osgood, C.E. Studies in synesthetic thinking: II The role of form in visual responses to music. Journal of General Psychology, 1942, 26, 199-222.

Kimble, G.A., and Dufort, R.H. Meaningfulness and isolation as factors in verbal learning. Journal of Experimental Psychology, 1955, 50, 361-368.

Kimura, T. Apparent warmth and heaviness of colours. Japanese Journal of Psychology, 1950, 20, 33-36.

Koffka, K. The Growth of the Mind. New York: Harcourt, Brace and Company, 1925.

Lang, M. Character Analysis Through Color, 1940, The Crimson Press.

Lawler, C.O., and Lawler, E.E. Color-mood associations in young children. Journal of Genetic Psychology, 1965, 107, 28-32.

Mandler, G., and Campbell, E.H. Effect of variation in associative frequency of stimulus and response members on paired-associate learning. Journal of Experimental Psychology, 1957, 54, 269-273.

McGinnies, E.M. Emotionality and perceptual defense. Psychology Review, 1949, 56, 244-251.

Miller, G.A., Selfridge, J.A. Verbal context and the recall of meaningful material. American Journal of Psychology, 1950, 63, 176-185.

Newhall, S. Warmth and coolness of colors. Psychological Record, 1941, 4, 198-212.

Noble, C.E. An analysis of meaning. Psychological Review, 1952, 59, 421-430.

Noble, C.E. The role of stimulus meaning (m) in serial verbal learning. Journal of Experimental Psychology, 1952, 43, 437-446.

Noble, C.E. The familiarity-frequency relationship. Journal of Experimental Psychology, 1954, 47, 13-16.

Noble, C.E. Compound trial-and-error learning as a function of response availability (Nr). Journal of Experimental Psychology, 1955, 49, 93-96.

Noble, C.E. The effect of familiarization upon serial verbal learning. Journal of Experimental Psychology, 1955, 49, 333-338.

Noble, C.E., and McNeely, D.A. The role of meaningfulness (m) in paired-associate learning. Journal of Experimental Psychology, 1957, 53, 16-22.

Odbert, H.S., Karwoski, T.F., and Eckerson, A.B. Studies in synesthetic thinking: I Musical and verbal association of color and mood. Journal of General Psychology, 1942, 26, 153-173.

Osgood, C.E. The nature and measurement of meaning. Psychology Bulletin, 1952, 49, 193-237.

Osgood, C.E. The cross-cultural generality of visual-verbal synesthetic tendencies. Behavioral Science, 1959, 5, 146-169.

Osgood, C.E., and Tannenbaum, P. The Measurement of Meaning. Urbana: University of Illinois Press, 1957.

Payne, M. Apparent weight as a function of color. American Journal of Psychology, 1958, 71, 725-730.

Pecjak, V. Verbal synesthesiae of colors, emotions, and days of the week. Journal of Verbal Learning and Behavior, 1970, 9, 623-626.

Postman, L. The effects of language habits on the acquisition and retention of verbal associates. Journal of Experimental Psychology, 1962, 64, 7-19.

Rorschach, H. Psychodiagnostics. Ed: W. Morgenthaler, New York: Grune and Stratton, 1942.

Rosinsk, R.R., Golinkoff, R.M., and Kukish, K.S. Automatic semantic processing in a pircure-work interference task. Child Development, 1975, 46, 247-253.

Russell, B. An Inquiry into Meaning and Truth. New York: Morton, 1940.

Saltz, E. The Cognitive Base of Human Learning. Homewood: Dorsey Press, 1971.

Schick, J. Relationship between personality and color in the performance of a gross motor skill. Journal of the Association for the Study of Perception, 1977, (Spr.) 12, 19-22.

Schaie, K.W. Scaling the association between colors and mood tones. American Journal of Psychology, 1961, 74, 266-273.

Schaie, K.W. The color pyramid test: a nonverbal technique for personality assessment. Psychology Bulletin, 1963, 60, 530-547.

Schaie, K.W. On the relation of color and personality. Journal of Projective Techniques and Personality Assessment, 1966, 30, 512-524.

Slen, N.C. Color preferences of 1,368 Chinese students. Journal of Social Psychology, 1937, 8, 485-204.

Snider, J.G. Semantic Differential Technique; A Source Book, Ed. James G. Snider and Charles Osgood, Chicago: Aldine Publishing Company, 1969.

Solomon, R.L., and Postman, L. Frequency of usage as a determinant of recognition thresholds for words. Journal of Experimental Psychology, 1952, 43, 195-201.

Staats, A., and Staats, C. Meaning and m, correlated but separate. Psychological Review, 1959, 66, 136-144.

Szalay, L.B., and Brent, J. The analysis of cultural meanings through free verbal associations. Journal of Social Psychology, 1967, 72, 161-187.

Tanaka, Y.T. Oyama, and Osgood, C. A cross-culture and cross-concept study of the generality of semantic spaces. Journal of Verbal Learning and Verbal Behavior, 1963, 2, 392-405.

Thorndike, E.L. On the frequency of semantic changes in modern english. Journal of General Psychology, 1948, 39, 23-27.

Thorndike, E.L., and Lorge, I. The Teacher's Wordbook of 30,000 Words. New York: Teachers College, Columbia University, 1944.

Underwood, B.J., and Richardson, J. The influence of meaningfulness, intralist similarity, and serial position on retention. Journal of Experimental Psychology, 1956, 52, 119-126.

Underwood, B.J., and Richardson, J. Studies in distributed practice: XVIII The influence of meaningfulness and intralist similarity of serial nonsense lists. Journal of Experimental Psychology, 1958, 56, 213-219.

Underwood, B.J., and Schulz, R.W. Meaningfulness and Verbal Learning. Chicago: J.B. Lippincott, 1960.

Warden, G.J., and Flynn, E.L. The effect of color on apparent size and weight. American Journal of Psychology, 1926, 37, 398-401.

Washburn, M.F. Note of the affective value of color. American Journal of Psychology, 1911, 22, 114-115.

Wexner, L.B. The degree to which colors (hues) are associated with mood-tones. Journal of Applied Psychology, 1954, 38, 432-435.

Williams, J.E. Connotations of color names among negroes and caucasians. Perceptual and Motor Skills, 1964, 18, 721-731.

Williams, J.E., and Foley Jr., J.W. Connotative meanings of color names and color hues. Perceptual and Motor Skills, 1968, 26, 499-502.

Winick, C. Taboo and disapproved colors and symbols in various countries. Journal of Social Psychology, 1963, 59, 361-368.

Wright, B. The influence of hue, lightness, and saturation on apparent warmth and weight. American Journal of Psychology, 1962, 75, 232-241.

Wright, B., and Gardner, B. Effect of color on black and white pictures. Perceptual and Motor Skills, 1960, 11, 301-304.